

THAT WHICH IS CLAIMED:

1. A system for delivering a pharmaceutical formulation to a patient, said system comprising:

a container having a pharmaceutical formulation comprising at least one medicament present therein;

a metering assembly in communication with said container;

a tubular nozzle having an inlet configured in size to communicate with the metering assembly, and an outlet for directing the medicament to a patient, wherein the tubular nozzle has at least one curved portion;

wherein the tubular nozzle has a defined length and a longitudinal axis that is curvilinear throughout the defined length of the tubular nozzle, the tubular nozzle having a radius of curvature of at least 2.5 times the inner diameter of the tubular nozzle present within the curved portion.

2. The system according to Claim 1, wherein the tubular nozzle includes at least one tapered section.

3. The system according to Claim 2, wherein the at least one tapered section has an angle Θ less than about 45°.

4. The system according to Claim 2, wherein the at least one tapered section is positioned at a proximal end of the tubular nozzle.

5. The system according to Claim 2, wherein the at least one tapered section is positioned at a distal end of the tubular nozzle.

6. The system according to Claim 2, wherein the at least one tapered section decreases in the direction of the distal end of the tubular nozzle.

7. The system according to Claim 2, wherein the at least one tapered section increases in the direction of the distal end.

8. The system according to Claim 1, wherein the tubular nozzle includes at least one linear portion.

9. The system according to Claim 8, wherein the tubular nozzle includes a plurality of linear portions located at a distal end of the tubular nozzle and a proximal end of the tubular nozzle.

10. The system according to Claim 1, wherein the tubular nozzle includes at least one throat.

11. The system according to Claim 1, wherein the tubular nozzle is constructed from a metallic material.

12. The system according to Claim 11, wherein the metallic material comprises a metal selected from the group consisting of stainless steel, gold, nickel, brass, aluminum, titanium, tantalum, iron, and combinations thereof.

13. The system according to Claim 1, wherein the tubular nozzle is constructed from a polymeric material.

14. The system according to Claim 13, wherein the polymeric material is selected from the group consisting of polyethylene (PE), polypropylene (PP), polymethylmethacrylate (PMMA), polyvinyl chloride (PVC), polyvinylidene chloride (PVDC), polyvinyl fluoride (PVF), polyvinylidene fluoride (PVDF), polychlorotrifluoroethylene (PCTFE), polytetrafluoroethylene (PTFE), fluorinated ethylene propylene (FEP), perfluoroalkoxy (PFA), polyamide (PA), polyethylene terephthalate (PET), polybutylene terephthalate (PBT), polyetherimide (PEI), polyamideimide (PAI), polyimide (PI), polysulfone (PS), polyarylsulfone (PAS) polyethersulfone (PES), polyphenylene sulfide (PPS), polyetheretherketone (PEEK), polydimethylsiloxane (PDMS) and polycarbonate (PC), combinations thereof, and blends thereof.

15. The system according to Claim 1, wherein the medicament is selected from the group consisting of analgesics, anginal preparations,
5 antiallergics, antiinfectives, antihistamines, anti-inflammatories, antitussives, diuretics, hormones, therapeutic proteins, peptides, medicaments for treating erectile dysfunction, and combinations thereof.

10 16. The system according to Claim 1, wherein the at least one medicament is selected from the group consisting of fluticasone, beclomethasone, salmeterol, albuterol, ipratropium, salts thereof, esters thereof, solvates thereof, and combinations thereof.

15 17. The system according to Claim 1, wherein the at least one medicament comprises albuterol sulfate.

18. The system according to Claim 1, wherein the at least one medicament comprises salmeterol xinafoate and fluticasone propionate.

20 19. The system according to Claim 1, wherein the at least one medicament comprises fluticasone propionate.

25 20. The system according to Claim 1, wherein the at least one medicament comprises beclomethasone dipropionate.

21. The system according to Claim 1, wherein the outlet of the tubular nozzle is oriented substantially horizontal.

30 22. The system according to Claim 1, wherein the system is present as an oral inhaler.

23. The system according to Claim 1, wherein the system is present as an intranasal inhaler.

24. The system according to Claim 1, further comprising at least one
5 additional tubular nozzle.

25. The system according to Claim 1, wherein the system is present as an oral inhaler, and wherein said container is present as a canister, said pharmaceutical formulation is present as a pharmaceutical aerosol formulation
10 comprising the at least one medicament and at least one propellant, said metering assembly is present as a metering valve assembly including a valve stem, wherein a passage for dispensing the at least one medicament is positioned in the valve stem; and wherein the inlet of said tubular nozzle is configured in size to communicate with the dispensing passage.
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26. The system according to Claim 25, wherein the inlet of the tubular nozzle is substantially aligned with the dispensing passage.

27. The system according to Claim 25, wherein the tubular nozzle includes at least one tapered section.
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28. The system according to Claim 27, wherein the at least one tapered section has an angle Θ less than about 45°.
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29. The system according to Claim 27, wherein the at least one tapered section is positioned at a proximal end of the tubular nozzle.

30. The system according to Claim 27, wherein the at least one tapered section is positioned at a distal end of the tubular nozzle.
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31. The system according to Claim 27, wherein the at least one tapered section decreases in the direction of the distal end of the tubular nozzle.

5 32. The system according to Claim 27, wherein the at least one tapered section increases in the direction of the distal end.

33. The system according to Claim 25, wherein the tubular nozzle includes at least one linear portion.

10 34. The system according to Claim 33, wherein the tubular nozzle includes a plurality of linear portions located at a distal end of the tubular nozzle and a proximal end of the tubular nozzle.

15 35. The system according to Claim 25, wherein the tubular nozzle includes at least one throat.

20 36. The system according to Claim 25, wherein the inhaler further comprises a means of actuation containing the canister, and wherein said means of actuation assists in delivering medicament to a patient.

25 37. The system according to Claim 25, further comprising a mouthpiece having an outlet, wherein a portion of the tubular nozzle containing the tubular nozzle outlet is positioned in the mouthpiece.

38. The system according to Claim 37, wherein the outlet of the tubular nozzle has an exit orifice, and wherein the exit orifice is substantially even with the outlet of the mouthpiece.

30 39. The system according to Claim 37, wherein the exit orifice of the tubular nozzle is recessed from the outlet of the mouthpiece.

40. The system according to Claim 37, wherein the portion of the tubular nozzle containing the tubular nozzle outlet is coaxial with the central axis of the mouthpiece.

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41. The system according to Claim 37, wherein the tubular nozzle outlet is at an angle ranging from about 0° to about 30° relative to the central axis of the mouthpiece.

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42. The system according to Claim 25, further comprising a connector that receives a proximal end of the tubular nozzle, and wherein the connector engages the valve stem.

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43. The system according to Claim 42, wherein the tubular nozzle and the connector are constructed from the same material.

44. The system according to Claim 42, wherein the tubular nozzle and the connector are constructed from different material.

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45. The system according to Claim 25, wherein the tubular nozzle is constructed from a metallic material.

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46. The system according to Claim 45, wherein the metallic material comprises a metal selected from the group consisting of stainless steel, gold, nickel, brass, aluminum, titanium, tantalum, iron, and combinations thereof.

47. The system according to Claim 25, wherein the tubular nozzle is constructed from a polymeric material.

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48. The system according to Claim 47, wherein the polymeric material is selected from the group consisting of polyethylene (PE), polypropylene (PP), polymethylmethacrylate (PMMA), polyvinyl chloride

(PVC), polyvinylidene chloride (PVDC), polyvinyl fluoride (PVF), polyvinylidene fluoride (PVDF), polychlorotrifluoroethylene (PCTFE), polytetrafluoroethylene (PTFE), fluorinated ethylene propylene (FEP), perfluoroalkoxy (PFA), polyamide (PA), polyethylene terephthalate (PET),
5 polybutylene terephthalate (PBT), polyetherimide (PEI), polyamideimide (PAI), polyimide (PI), polysulfone (PS), polyarylsulfone (PAS) polyethersulfone (PES), polyphenylene sulfide (PPS), polyetheretherketone (PEEK), polydimethylsiloxane (PDMS) and polycarbonate (PC), combinations thereof, and blends thereof.

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49. The system according to Claim 25, wherein the diameter of the inlet of the tubular nozzle is similar to the diameter of the dispensing passage.

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50. The system according to Claim 25, wherein the medicament is selected from the group consisting of analgesics, anigal preparations, antiallergics, antiinfectives, antihistamines, anti-inflammatories, antitussives, diuretics, hormones, therapeutic proteins, peptides,
20 medicaments for treating erectile dysfunction, and combinations thereof.

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51. The system according to Claim 25, wherein the at least one medicament is selected from the group consisting of fluticasone, beclomethasone, salmeterol, albuterol, ipratropium, salts thereof, esters thereof, solvates thereof, and combinations thereof.

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52. The system according to Claim 25, wherein the at least one medicament comprises albuterol sulfate.

53. The system according to Claim 25, wherein the at least one medicament comprises salmeterol xinafoate and fluticasone propionate.

54. The system according to Claim 25, wherein the at least one medicament comprises fluticasone propionate.

55. The system according to Claim 25, wherein the at least one medicament comprises beclomethasone dipropionate.

56. The system according to Claim 25, wherein the outlet of the tubular nozzle is oriented substantially horizontal.

57. The system according to Claim 25, further comprising at least one additional tubular nozzle.

58. A method of administering at least one medicament to a patient, said method comprising:

providing a system as defined by Claim 1; and
activating the system to deliver the at least one medicament to the patient.

59. The method according to Claim 57, wherein the at least one medicament is selected from the group consisting of analgesics, anginal preparations, antiallergics, antiinfectives, antihistamines, anti-inflammatories, antitussives, diuretics, hormones, therapeutic proteins, peptides, medicaments for treating erectile dysfunction, and combinations thereof.

60. The method according to Claim 57, wherein the at least one medicament is selected from the group consisting of fluticasone, beclomethasone, salmeterol, albuterol, ipratropium, salts thereof, esters thereof, solvates thereof, and combinations thereof.

61. The method according to Claim 57, wherein the at least one medicament comprises albuterol sulfate.

62. The method according to Claim 57, wherein the at least one medicament comprises salmeterol xinafoate and fluticasone propionate.

5 63. The method according to Claim 57, wherein the at least one medicament comprises fluticasone propionate.

64. The method according to Claim 57, wherein the at least one medicament comprises beclomethasone dipropionate.

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